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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/599,032	09/18/2006	Wibo Daniel Van Noort	NL040297	3248

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EXAMINER	
FORD, KENISHA V	
ART UNIT	**PAPER NUMBER**
2809	

NOTIFICATION DATE	DELIVERY MODE
08/24/2007	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

ip.department.us@nxp.com

Office Action Summary	Application No.	Applicant(s)	
	10/599,032	VAN NOORT ET AL.	
	Examiner	Art Unit	
	Kenisha V. Ford	2809	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-16* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-16* is/are rejected.

7)☒ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *18 September 2006* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *11/16/06*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference character "5" has been used to designate both a second recess and a groove. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

1. Claim 1 is objected to because of the following informalities: inconsistent numbering. Two different numbers were attributed to the same element. Appropriate correction is required.

2. Claim 3 is objected to because the reference character "5" is referring to what appears to be two different parts. In this case, the claim will be interpreted as if the reference to a groove is intended to further limit the claim. Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claim 1 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The phrase "characterized in that for both the dielectric layer and the further dielectric layer use is made of the same dielectric layer (6)" in lines 15-17. The phrase is unclear because it does not state what dielectric layer is used when "use is made of the same dielectric layer" nor does it state what the dielectric layer is used for.

The statement "substantially completely" in line 20 is unclear because it is unknown whether the recess is partially or completely filled since it cannot be both.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1,2 and 13-16 are rejected under 35 U.S.C. 102(b) as being anticipated by Hopper et al. (US 6,285,057 B1).

Regarding claims 1 and 16, Hopper et al. discloses a method for forming a semiconductor device comprising:

- A substrate and a semiconductor body where at least one element is formed (col. 2, 1-7)
- An island formed by forming a first recess in which the walls are covered with a dielectric layer (col. 2, lines 7-21)
- A cavity is formed by removing parts of the semiconductor body by etching the bottom of the first recess, thereby forming an island over where the cavity (col. 2, lines 33-39)
- A second recess is formed in the surface of the semiconductor body and the one of the walls covered with a dielectric layer (col.4, lines 26-37 and lines 49-51)

Regarding claim 2, Hopper et al. teaches that after the formation of the first and second recesses, referred to as trenches, the dielectric layer is applied and then removed by anisotropic etching (col. 4, line 23-col. 5, line 4).

Regarding claims 13-15, the walls of the cavity, or expanded trench, is covered with an electrically conductive trench fill with a high conductivity (col. 2, lines 39-43 and col. 3, lines 16-60).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claims 3-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hopper et al. (US 6,285,057 B1) in view of Takemura et al. (US 5,576,221).

Hopper et al. discloses a method for forming a semiconductor device comprising a substrate wherein a first recess is formed and the walls and bottom of which are covered with a dielectric layer; the semiconductor is etched and thereby forming a cavity wherein a second recess is formed and walls of which are also covered with a dielectric layer (col. 2, lines 1-43).

Regarding claim 3, while Hopper et al. teaches the formation of a second recess/trench, it does not teach that the second recess is formed as a groove around the first recess thereby forming a "semiconductor island".

However, Takemura et al. discloses this very thing by teaching that the silicon layer is encircled with the groove that is formed (col. 2, line 66-col.3, line 7).

Regarding claim 4, Hopper et al. does not teach the formation of further grooves in the semiconductor body that further divides the island.

Takemura et al. discloses this very thing by teaching that grooves are formed and the epitaxial layer is removed from in between (col. 4, lines 64-67).

Regarding claim 5, the shape of the groove viewed in projection is square is well known in the art.

Regarding claims 6 and 7, Hopper et al. does not teach the formation of the semiconductor body from two layers of different materials.

Takemura et al. discloses this very thing by teaching that there is the formation of two layers one of silicon/germanium.silicon-mixed-crystal layer and the second was a silicon layer on top of that (col. 3, lines 10-16).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teachings of Takemura et al. in the device of Hopper et al. to form two semiconductor layers; one of a mixed crystal of silicon and germanium on the substrate

and one of silicon applied thereon and have a second recess formed as a groove thereby forming a semiconductor island and forming additional grooves that then further divides the semiconductor into sub-islands, since it also makes it possible to form a compact, high performance OEIC by simultaneously solving the problems of loss and reduced speed due to the connection between packages (Takemura, col. 4, lines 18-21).

9. Claims 8-10 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hopper et al. (US 6,285,057 B1) in view of Wang et al. (US 2003/0045119 A1).

Hopper et al. discloses a method for forming a semiconductor device comprising a substrate wherein a first recess is formed and the walls and bottom of which are covered with a dielectric layer, the semiconductor is etched and thereby forming a cavity wherein a second recess is formed and walls of which are also covered with a dielectric layer (col. 2, lines 1-43).

Though Hopper et al et al. does disclose the formation of a cavity by expanding the first recess/trench laterally by etching (col. 2, lines 34-39) it does not teach that the layer is removed by this etching.

However, Wang et al. teaches this very thing, that the hard mask is removed by a wet etch are that extends into the second depth region or cavity that has a larger cross-sectional area than the first trench/recess (page 2, paragraphs 33 & 34).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Wang et al. in the device of Hopper et al. to achieve the creation of a cavity by the lateral expansion of the first trench/recess in order to increase the surface area in the trench thereby increasing the capacitance (Wang et al.- pg.1, para. 4, lines 9-11).

10. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hopper et al. (US 6,285,057 B1) in view of Wang et al. (US 2003/0045119 A1) as applied to claims 8-10 above, and further in view of Takemura et al.

Hopper et al. fails to teach the limitations of claim 11.

Wang et al. teaches that the cavity has a larger cross-sectional area than the first trench/recess, as referenced above in (page 2, paragraphs 33 & 34). However, as referenced above in Takemura et al. the second recess formed as a groove around the first recess layer is encircled with the groove that is formed (col. 2, line 66-col. 3, line 7).

It would have been obvious to one of ordinary skill in the art a the time the invention was made to combine the teachings of Takemura et al. with those of Wang et al. in the device of Hopper et al. and assume that the cavity could be the same size or larger than the second recess since they both are larger than the first recess with the cavity extending laterally from it and the and the second recess surrounding it.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kenisha V. Ford whose telephone number is (571) 270-3328. The examiner can normally be reached on Monday-Thursday 7:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Akm Ullah can be reached on (571) 272-2361. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

KVF

AKM ULLAH
SUPERVISORY PATENT EXAMINER